

flexible material;

said inner and outer shells being bonded together to form a perimetric bond about a perimeter of the inflatable cell, said perimetric bond defining the inflatable cell as a volume between said inner and outer shells and within the perimetric bond;

said inner and outer shells being further bonded together to form a plurality of compartmental bonds within the inflatable cell bond, said plurality of compartmental bonds defining at least three intra-cell compartments

said perimetric cell bond including first and second perimetric cell bond portions, said first and second perimetric cell bond portions being substantially parallel thereto, wherein a portion of said compartmental bonds partly extending between said first and second perimetric cell bond portions;

said compartmental bonds extending between said first and second perimetric cell bond portions including perforations to allow for confluent air flow between adjacent intra-cell compartments within a cell;

said adjacent intra-cell compartments within a cell being spatially fixed relative to each other such that upon inflation of said adjacent intra-cell compartments within the cell, the cell becomes circumferentially constricted;

said first and second inflatable cells being non-confluent such that said first and second inflatable cells are separately inflatable;

means for laterally coupling outermost compartments so as to form a sleeve such that the sleeve has a first circumference when said intra-cell compartments are deflated and a second circumference when said intra-cell compartments are inflated, said second circumference being less than said first circumference so as to provide for circumferential constriction, said second circumference being defined as a circumference passing through center points of each contiguous inflated intra-cell compartment;

inflating means for intermittently inflating said intra-cell compartments of said first and second inflatable cells; and

control means for determining the temporo-spatial regime of cell inflation.

74. The device of claim 73 wherein a ratio of said second circumference to said first circumference is greater than 0.64.

75. An automatic portable ambulant system for applying pressure to a body limb comprising:

a sleeve including first and second inflatable cells;

said first and second inflatable cells each including at least three intra-cell compartments;

said intra-cell compartments being confluent;

said intra-cell compartments being elongated along a longitudinal axis;

said first and second inflatable cells being longitudinally adjacent to each other so as to be adapted to be arranged coaxially with respect to a primary axis of a body limb

said first and second inflatable cells each including inner and outer shells of durable flexible material;

said inner and outer shells being bonded together to form a perimetric bond about a perimeter of the inflatable cell, said perimetric bond defining the inflatable cell as a volume between said inner and outer shells and within the perimetric bond;

said inner and outer shells being further bonded together to form a plurality of compartmental bonds within the inflatable cell bond, said plurality of compartmental bonds defining at least three intra-cell compartments

said perimetric cell bond including first and second perimetric cell bond portions, said first and second perimetric cell bond portions being substantially parallel thereto, wherein a portion of said compartmental bonds partly extending between said first and second perimetric cell bond portions;

said compartmental bonds extending between said first and second perimetric cell bond portions including perforations to allow for confluent air flow between adjacent intra-cell compartments within a cell;

said first inflatable cell becoming circumferentially constricted when said intra-cell compartments of said first inflatable cell are inflated;

said second inflatable cell becoming circumferentially constricted when said intra-cell

compartments of said second inflatable cell are inflated;

said first and second inflatable cells being non-confluent such that the first and second inflatable cells are separately inflatable;

means for laterally coupling the outermost intra-cell compartments within a cell so as to form a sleeve such that the sleeve has a first circumference when said intra-cell compartments are deflated and a second circumference when said intra-cell compartments are inflated, said second circumference being less than said first circumference so as to provide for circumferential constriction, said second circumference being defined as a circumference passing through center points of each contiguous inflated intra-cell compartment; and

a portable hand-held pump unit for intermittently inflating any one or more selected cells of the sleeve via a conduit, said pump unit including a control unit for determining the sequence of cell inflation and deflation.

76. The system of claim 75 wherein said pump unit is battery operated.

77. The system of claim 76 wherein said pump unit comprises a rechargeable battery.

78. The system of claim 75 wherein said pump unit comprises an air compressor.

79. The system of claim 75 wherein said conduit comprises a single tube for delivering fluid to said sleeve.

80. The system of claim 79 wherein said conduit comprises means for indicating to said control unit an appropriate inflation and deflation sequence.

81. The system of claim 75 wherein a ratio of said second circumference to said first circumference is greater than 0.64.

82. The system of claim 75 wherein said sleeve comprises at least one self-operated valve.

83. A method for immobilizing a fractured bone in a limb comprising:

(a) inserting the limb into a massaging sleeve comprising first and second inflatable cells including at least three intra-cell compartments, the intra-cell compartments being confluent, each compartment being elongated along a longitudinal axis, the longitudinal axes of the compartments substantially aligning with the primary axis of the limb, the first and second inflatable cells being longitudinally adjacent each other, and each of the first and second inflatable cells being arranged such that each cell encompasses the limb and an axis of each of the encompassed cells being coaxial with respect to a lengthwise axis of the limb, wherein the inflatable cells each comprise inner and outer shells of durable flexible material, the inner and outer shells being bonded together about a perimetric cell bond to define the inflatable cell therebetween, the inner and outer shells being further bonded together along compartmental bonds within the perimetric cell bond to define the plurality of intra-cell compartments, wherein the perimetric cell bond includes upper and lower perimetric cell bonds extending substantially in a lateral direction, and left and right perimetric cell bonds extending substantially in the longitudinal direction, and wherein the compartmental bonds partly extend between the upper and lower perimetric cell bonds, wherein the compartmental bonds include perforations to allow for confluent air flow between compartments within a cell, compartments within a cell being spatially fixed relative to each other;

(b) intermittently inflating one of the first or second inflatable cells to apply pressure to the limb by circumferentially constricting the intermittently inflated cell, the inflated cell of the sleeve having a first circumference when the intra-cell compartments of the cell are deflated and a second circumference when the intra-cell compartments of the cell are inflated, the second circumference being less than the first circumference so as to provide for circumferential constriction, the second circumference being defined as a circumference passing through center points of each contiguous inflated intra-cell compartment.

84. The device of claim 83 wherein a ratio of the second circumference to the first circumference is greater than 0.64.

85. A device for applying pressure to a body limb having a primary axis comprising:  
first and second inflatable cells;  
said first and second inflatable cells each including at least three intra-cell compartments;  
said intra-cell compartments being confluent;  
said intra-cell compartments being elongated along a longitudinal axis and being substantially rectangular in shape when deflated and substantially cylindrical in shape when inflated;  
said first and second inflatable cells being adjacent each other and arranged coaxially with respect to the primary axis of the limb;  
said first and second inflatable cells each including inner and outer shells of durable flexible material;  
said first and second inflatable cells each including inner and outer shells of durable flexible material;  
said inner and outer shells being bonded together to form a perimetric bond about a perimeter of the inflatable cell, said perimetric bond defining the inflatable cell as a volume between said inner and outer shells and within the perimetric bond;  
said inner and outer shells being further bonded together to form a plurality of compartmental bonds within the inflatable cell bond, said plurality of compartmental bonds defining at least three intra-cell compartments  
said perimetric cell bond including first and second perimetric cell bond portions, said first and second perimetric cell bond portions being substantially parallel thereto, wherein a portion of said compartmental bonds partly extending between said first and second perimetric cell bond portions;  
said compartmental bonds extending between said first and second perimetric cell bond portions including perforations to allow for confluent air flow between adjacent intra-cell compartments within a cell;

01  
said first inflatable cell becoming circumferentially constricted when said intra-cell compartments of said first inflatable cell are inflated;

said second inflatable cell becoming circumferentially constricted when said intra-cell compartments of said second inflatable cell are inflated;

said first and second inflatable cells being non-confluent such that said first and second inflatable cells are separately inflatable;

means for laterally coupling the outermost intra-cell compartments within a cell so as to form a sleeve such that the sleeve has a first circumference when said intra-cell compartments are deflated and a second circumference when said intra-cell compartments are inflated, said second circumference being less than said first circumference so as to provide for circumferential constriction, said second circumference being defined as a circumference passing through center points of each contiguous inflated intra-cell compartment;

inflating means for intermittently inflating the first and second inflatable cells; and

control means for determining the temporo-spatial regime of cell inflation.

86. The device of claim 85 wherein a ratio of said second circumference to said first circumference is greater than 0.64.

87. An automatic portable ambulant system for applying pressure to a body limb comprising:

a sleeve including first and second inflatable cells;

said first and second inflatable cells each including at least three intra-cell compartments;

said intra-cell compartments being confluent;

said intra-cell compartments being elongated along a longitudinal axis and being substantially rectangular in shape when deflated and substantially cylindrical in shape when inflated;

said first and second inflatable cells being adjacent each other and arranged coaxially with respect to the primary axis of the limb;

said first and second inflatable cells each including inner and outer shells of durable

flexible material;

said inner and outer shells being bonded together to form a perimetric bond about a perimeter of the inflatable cell, said perimetric bond defining the inflatable cell as a volume between said inner and outer shells and within the perimetric bond;

said inner and outer shells being further bonded together to form a plurality of compartmental bonds within the inflatable cell bond, said plurality of compartmental bonds defining at least three intra-cell compartments

said perimetric cell bond including first and second perimetric cell bond portions, said first and second perimetric cell bond portions being substantially parallel thereto, wherein a portion of said compartmental bonds partly extending between said first and second perimetric cell bond portions;

said compartmental bonds extending between said first and second perimetric cell bond portions including perforations to allow for confluent air flow between adjacent intra-cell compartments within a cell;

said first inflatable cell becoming circumferentially constricted when said intra-cell compartments of said first inflatable cell are inflated;

said second inflatable cell becoming circumferentially constricted when said intra-cell compartments of said second inflatable cell are inflated;

said first and second inflatable cells being non-confluent such that said first and second inflatable cells are separately inflatable;

means for laterally coupling the outermost intra-cell compartments within a cell so as to form a sleeve such that the sleeve has a first circumference when said intra-cell compartments are deflated and a second circumference when said intra-cell compartments are inflated, said second circumference being less than said first circumference so as to provide for circumferential constriction, said second circumference being defined as a circumference passing through center points of each contiguous inflated intra-cell compartment; and

a portable hand-held pump unit for intermittently inflating any one or more selected cells of the sleeve via a conduit, said pump unit including a control unit for determining the sequence of cell inflation and deflation.

88. The system of claim 87 wherein a ratio of said second circumference to said first circumference is greater than 0.64.

89. The system of claim 87 wherein said conduit comprises a single tube for delivering fluid to said sleeve.

90. The system of claim 89 wherein said conduit comprises means for indicating to said control unit an appropriate inflation and deflation sequence.

91. The system of claim 87 wherein said sleeve comprises at least one self-operated valve.

92. A device for applying pressure to a body limb having a primary axis comprising:  
an inflatable cell;  
said inflatable cell including at least two intra-cell compartments  
said intra-cell compartments being confluent, each intra-cell compartment being elongated in a direction of the primary axis;  
said inflatable cell further including inner and outer shells of durable flexible material;  
said inner and outer shells being bonded together about a perimetric cell bond;  
said inner and outer shells being further bonded together along compartmental bonds within said perimetric cell bond to define each intra-cell compartment;  
said perimetric cell bond including upper and lower perimetric cell bonds;  
said compartmental bonds partly extending between said upper and lower perimetric cell bonds;  
said compartmental bonds including perforations to allow for confluent air flow between adjacent intra-cell compartments within said cell, adjacent intra-cell compartments being spatially fixed relative to each other, such that upon inflation, said cell becomes circumferentially constricted;



11  
said inflatable cell having a first circumference when said intra-cell compartments are deflated and a second circumference when said intra-cell compartments are inflated, said second circumference being less than said first circumference so as to provide for circumferential constriction, said second circumference being defined as a circumference passing through center points of each contiguous inflated intra-cell compartment.

93. The device of claim 92 wherein a ratio of said second circumference to said first circumference is greater than 0.64.

94. The device of claim 92, further comprising:  
inflating means for intermittently inflating said inflatable cell; and  
control means for determining the temporo-spatial regime of cell inflation.

95. The device of claim 92, further comprising control means for determining the temporo-spatial regime of cell inflation.

96. The device of claim 92 wherein said inflatable cell comprises at least one self-operated valve.

97. A device for applying pressure to a body limb having a primary axis comprising:  
an inflatable cell;  
said inflatable cell including at least two intra-cell compartments;  
said intra-cell compartments being confluent to allow for confluent air flow between adjacent intra-cell compartments within said cell, adjacent intra-cell compartments being spatially fixed relative to each other, such that upon inflation, said cell becomes circumferentially constricted;

said inflatable cell having a first circumference when said intra-cell compartments are deflated and a second circumference when said intra-cell compartments are inflated, said second circumference being less than said first circumference so as to provide for circumferential

constriction, said second circumference being defined as a circumference passing through center points of each contiguous inflated intra-cell compartment.

98. The device of claim 97 wherein a ratio of said second circumference to said first circumference is greater than 0.64.

99. The device of claim 97, further comprising:  
inflating means for intermittently inflating said inflatable cell; and  
control means for determining the temporo-spatial regime of cell inflation.

100. The device of claim 97, further comprising control means for determining the temporo-spatial regime of cell inflation.

101. The device of claim 97, further comprising a portable hand-held pump unit for intermittently inflating said inflatable cell via a conduit;  
said portable hand-held pump unit including a control unit for determining a sequence of cell inflation and deflation.

102. The device of claim 101 wherein said conduit comprises a single tube for delivering fluid to said inflatable cell.

103. The device of claim 102 wherein said conduit comprises means for indicating to said control unit an appropriate inflation and deflation sequence.

104. The device of claim 97 wherein said inflatable cell comprises at least one self-operated valve.

105. An automatic portable ambulant system for applying pressure to a body limb comprising:

an inflatable cell; and

said inflatable cell including at least two intra-cell compartments;

said intra-cell compartments being confluent, each compartment being elongated in a direction of the primary axis; and

said inflatable cell further including inner and outer shells of durable flexible material;

said inner and outer shells being bonded together about a perimetric cell bond;

said inner and outer shells being further bonded together along compartmental bonds within said perimetric cell bond to define each intra-cell compartment;

said perimetric cell bond including upper and lower perimetric cell bonds;

said compartmental bonds partly extending between said upper and lower perimetric cell bonds;

said compartmental bonds including perforations to allow for confluent air flow between adjacent intra-cell compartments within said cell, adjacent intra-cell compartments being spatially fixed relative to each other, such that upon inflation, said cell becomes circumferentially constricted;

said inflatable cell having a first circumference when said intra-cell compartments are deflated and a second circumference when said intra-cell compartments are inflated, said second circumference being less than said first circumference so as to provide for circumferential constriction, said second circumference being defined as a circumference passing through center points of each contiguous inflated intra-cell compartment;

a portable hand-held pump unit for intermittently inflating said inflatable cell via a conduit;

said portable hand-held pump unit including a control unit for determining a sequence of cell inflation and deflation.

106. The system of claim 105 wherein said portable hand-held pump unit is battery operated.

107. The system of claim 105 wherein said portable hand-held pump unit comprises a rechargeable battery.

108. The system of claim 105 wherein said portable hand-held pump unit comprises an air compressor.

109. The system of claim 105 wherein said conduit comprises a single tube for delivering fluid to said inflatable cell.

110. The system of claim 105 wherein said conduit comprises means for indicating to said control unit an appropriate inflation and deflation sequence.

111. The system of claim 105 wherein said inflatable cell comprises at least one self-operated valve.

112. A device for applying pressure to a body limb having a primary axis comprising:  
an inflatable cell, said inflatable cell including at least two intra-cell compartments; said intra-cell compartments being confluent, each compartment being elongated in a direction of the primary axis;

said inflatable cell further including inner and outer shells of durable flexible material;

said inner and outer shells being bonded together about a perimetric cell bond;

said inner and outer shells being further bonded together along compartmental bonds within said perimetric cell bond to define each intra-cell compartment;

said perimetric cell bond including upper and lower perimetric cell bonds;

said compartmental bonds partly extending between said upper and lower perimetric cell bonds;

1  
said compartmental bonds including perforations to allow for confluent air flow between adjacent intra-cell compartments within said cell, adjacent intra-cell compartments being spatially fixed relative to each other, such that upon inflation of said cell, said cell becomes circumferentially constricted;

(1) said inflatable cell having a circumference of  $N\pi r$  when said cell is deflated and a circumference of  $2N\pi r$  when said cell is inflated, where  $N$  is the number of intra-cell compartments in said cell, and where  $r$  is the cross-sectional radius of each compartment when inflated, so as to provide for circumferential constriction.

113. The device of claim 112, wherein the fractional decrease in the circumference upon inflation is 0.36.

114. The device of claim 112, wherein the bond comprises a weldment.

115. The device of claim 112, wherein adjacent intra-cell compartments are contiguous.

116. The device of claim 112, wherein the perforations are located adjacent the perimetric cell bond.

117. The device of claim 112, wherein the perforations are located between compartmental bonds extending from the upper and lower perimetric bonds.

118. The device of claim 112, further comprising a fluid inlet to provide for inflation and deflation of the cell.

119. The device of claim 112, further comprising inflating means for intermittently inflating said inflatable cell.

120. The device of claim 112, further comprising:  
inflating means for intermittently inflating said inflatable cell; and  
control means for determining the temporo-spatial regime of cell inflation.

121. The device of claim 112, further comprising control means for determining the temporo-spatial regime of cell inflation.

122. A device for applying pressure to a body limb having a primary axis comprising:  
an inflatable cell, said inflatable cell including at least two intra-cell compartments; said intra-cell compartments being confluent to allow for confluent air flow between adjacent intra-cell compartments within said cell, adjacent intra-cell compartments being spatially fixed relative to each other, such that upon inflation of said cell, said cell becomes circumferentially constricted;

said inflatable cell having a circumference of  $N\pi r$  when said cell is deflated and a circumference of  $2Nr$  when said cell is inflated, where  $N$  is the number of intra-cell compartments in said cell, and where  $r$  is the cross-sectional radius of each compartment when inflated, so as to provide for circumferential constriction.

123. The device of claim 122, wherein the fractional decrease in the circumference upon inflation is 0.36.

124. The device of claim 122, further comprising a fluid inlet to provide for inflation and deflation of the cell.

125. The device of claim 122, further comprising inflating means for intermittently inflating said inflatable cell.

126. The device of claim 122, further comprising:  
inflating means for intermittently inflating said inflatable cell; and  
control means for determining the temporo-spatial regime of cell inflation.

127. The device of claim 122, further comprising control means for determining the temporo-spatial regime of cell inflation.

128. The device of claim 122, further comprising a portable hand-held pump unit for intermittently inflating said inflatable cell via a conduit;  
said portable hand-held pump unit including a control unit for determining a sequence of cell inflation and deflation.

129. The device of claim 128, wherein said portable hand-held pump unit is battery operated.

130. The device of claim 129, wherein said portable hand-held pump unit comprises a rechargeable battery.

131. The device of claim 128, wherein said portable hand-held pump unit comprises an air compressor.

132. The device of claim 128, wherein said conduit comprises a single tube for delivering fluid to said inflatable cell.

133. The device of claim 128, wherein said conduit comprises means for indicating to said control unit an appropriate inflation and deflation sequence.

134. The device of claim 128, wherein said inflatable cell comprises at least one self-operated valve.

135. An automatic portable ambulant system for applying pressure to a body limb comprising:

an inflatable cell, said inflatable cell including at least two intra-cell compartments; said intra-cell compartments being confluent, each compartment being elongated in a direction of the primary axis; and

said inflatable cell further including inner and outer shells of durable flexible material;

said inner and outer shells being bonded together about a perimetric cell bond;

said inner and outer shells being further bonded together along compartmental bonds within said perimetric cell bond to define each intra-cell compartment;

said perimetric cell bond including upper and lower perimetric cell bonds;

said compartmental bonds partly extending between said upper and lower perimetric cell bonds;

said compartmental bonds including perforations to allow for confluent air flow between adjacent intra-cell compartments within said cell, adjacent intra-cell compartments being spatially fixed relative to each other, such that upon inflation of said cell, said cell becomes circumferentially constricted;

said inflatable cell having a circumference of  $N\pi r$  when said cell is deflated and a circumference of  $2Nr$  when said cell is inflated, where  $N$  is the number of intra-cell compartments in said cell, and where  $r$  is the cross-sectional radius of each compartment when inflated, so as to provide for circumferential constriction;

a portable hand-held pump unit for intermittently inflating said inflatable cell via a conduit;

said portable hand-held pump unit including a control unit for determining a sequence of cell inflation and deflation.



136. The system of claim 135, wherein said portable hand-held pump unit is battery operated.

137. The system of claim 136, wherein said portable hand-held pump unit comprises a rechargeable battery.

138. The system of claim 136, wherein said portable hand-held pump unit comprises an air compressor.

139. The system of claim 136, wherein said conduit comprises a single tube for delivering fluid to said sleeve.

140. The system of claim 136, wherein said conduit comprises means for indicating to said control unit an appropriate inflation and deflation sequence.

141. The system of claim 136, wherein said sleeve comprises at least one self-operated valve.--